REMARKS/ARGUMENTS

Reconsideration and allowance of this application are respectfully requested.

Currently, claims 1-34 are pending in this application.

Request for Interview:

Applicant respectfully requests an interview to discuss the present response. An

Applicant Initiated Interview Request Form is attached hereto.

Rejection Under 35 U.S.C. §101:

Claim 28 was rejected under 35 U.S.C. §101 as allegedly being directed to non-

statutory subject matter. The Office Action states "Specifically, claim 28 [is] directed to

'a computer-implemented for processing signal...' and this is non-statutory." The Office

Action thus misquotes the invention of claim 28 which correctly requires "A computer-

implemented method for processing signals related to provide a virtual environment

interface...the method comprising...." The invention of claim 28, as correctly quoted,

requires a computer-implemented method which produces a useful, concrete and tangible

result such as instructing a client to obtain information from a server about the status of

an adjacent zone before the avatar enters the adjacent zone in certain circumstances.

Accordingly, claim 28 is clearly directed to statutory subject matter under 35 U.S.C.

§101.

Rejections Under 35 U.S.C. §103:

Claims 1, 3-5, 7-14, 16-21, 23-29 and 33-34 were rejected under 35 U.S.C. §103

as allegedly being unpatentable over Yerazunis et al (U.S. '382, hereinafter "Yerazunis")

in view of Suzuki et al (U.S. '982, hereinafter "Suzuki"). Applicant respectfully

traverses this rejection.

In order to establish a prima facie case of obviousness, all of the claim limitations must be taught or suggested by the prior art and there must be some suggestion or motivation either in the references themselves or in the knowledge generally available to one of ordinary skill in the art to modify the reference or to combine reference teachings. The combination of Yerazunis and Suzuki fails to teach or suggest all of the claim limitations. For example, the combination fails to teach or suggest "wherein the client is arranged to obtain information from said server means about the status of the adjacent zone <u>before the avatar enters the adjacent zone</u> only when the likelihood of the avatar moving within the predetermined range of the boundary of said adjacent zone is above a threshold," as required by independent claim 1 and its dependents. Similar comments apply to independent claims 24, 27 and 28. Similarly, the combination fails to teach or suggest "obtaining information for a zone adjacent to the zone in which the avatar is currently positioned before the avatar enters the adjacent zone when the predicted likelihood exceeds the threshold," as required by independent claim 29. The combination also fails to teach or suggest "wherein said client is arranged to communicate with the one or more servers to obtain information on the status of one or more further zones in the virtual environment before the avatar enters said one or more further zones when the likelihood of the avatar moving within a predetermined range of the boundary of said one or more further zones is above a threshold," as required by independent claim 21 and its dependents. With respect to independent claim 12, the combination fails to teach or suggest storing frequency data (i.e., probability) of categories of movement corresponding to potential movement of an avatar into a position within a predetermined range of a specified boundary and reading from this stored data prior to the avatar

moving across the boundary, frequency data of categories of movement such as would correspond to a potential movement of the avatar from its current position into a position within the predetermined range of said boundary.

Section 7 (page 3) of the Office Action apparently admits that Yerazunis fails to teach the above claim limitations. Applicant submits that Suzuki fails to remedy the admitted deficiencies of Yerazunis. Page 9, lines 1-2 of the Office Action states "As to point (1), Suzuki prior art reference is used to determine the likelihood of an avatar moving close to another avatar." Applicant respectfully disagrees. Suzuki does not perform any likelihood or probability determination.

Moreover, the Office Action fails to address the limitation relating to obtaining information about the status of an adjacent zone before the avatar enters the adjacent zone when the likelihood of the avatar within the predetermined range of the boundary of the adjacent zone is above a threshold. (See, e.g., last paragraph of claim 1). The combination of Suzuki and Yerazunis clearly fails to teach or suggest this limitation.

Col. 6, lines 10-16, col. 10, lines 22-34 and col. 24, lines 28-33 (specifically identified on page 9, lines 1-6 of the Office Action) in Suzuki relate to a virtual space system in which the distance d between two avatars is measured until it is less than a predetermined value D. When this occurs, and the degree of eye-to-eye contact between the avatars also satisfies some condition, a server establishes an audio-video channel between the two avatars concerned. So, if one were to consider the distance d as representing a circular boundary around one of the avatars, the audio-video channel will be disabled when the other avatar is outside the boundary, and enabled when inside the boundary. This situation is very similar to that described in the prior art section of the

description, e.g., at page 7, line 14 to page 8, line 21, and results in the disadvantages listed on page 8 since the client will have to download information about the adjacent zone when the zone is entered. Again, there is no suggestion of obtaining adjacent zone information prior to moving within that zone based on the likelihood of the avatar moving within a predetermined range of the adjacent zone boundary. No assessment of likelihood or probability is involved in Suzuki as claimed.

Applicant respectfully submits that one of ordinary skill in the art would not have been motivated to modify the teachings of Yerazunis in view of Suzuki. Yerazunis describes a transmitting terminal 12 at which user inputs can be made (e.g., to control an avatar), and a receiving terminal 14 which displays graphical output with the aid smoothing algorithms which mitigate jitter effects. There is no teaching or suggestion of multiple users controlling avatars from separate terminals, nor interaction between avatars. Applicant thus respectfully submits that one of ordinary skill in the art would not look to Suzuki to modify the teachings of Yerazunis. There is no requirement in Yerazunis to provide communication between remote users controlling different avatars. The rationale presented in the Office Action is thus clearly based improperly on hindsight reasoning.

Even assuming *arguendo* that one of ordinary skill in the art were motivated to combine the teachings of Yerazunis and Suzuki, the combination would still not have taught or suggested the further limitations described below. For example, independent claim 1 requires a terminal for providing a virtual environment interface to server means which maintains the virtual environment as a plurality of zones. Subsequent features relate to estimating movement of an avatar in relation to zone boundaries.

In contrast to the allegations of the Office Action, Yerazunis fails to teach or suggest zone or zone boundaries. Section 6 (page 3) of the Office Action apparently alleges that col. 3, lines 1-18 of Yerazunis discloses zone boundaries. Applicant respectfully disagrees.

Col. 3, lines 1-18 of Yerazunis states the following:

> "...automatically categorizing the information to be transmitted as to the predictability of future motion and applying appropriate smoothing algorithms based upon knowledge of what the characteristics of the future motion are likely to be. In one embodiment the system switches between a linear extrapolation algorithm for hypothesized future locations, linear interpolation for short-term predictable locations, and a Catmull-Rom spline for long term predictable locations.
>
> For instance, a virtual reality environment may have a trolley-car moving within the environment on a fixed course (the trolley track). The path between stops for the trolley is completely determined; the only variable is the starting time. Once the trolley starts to move, it's future position can be exactly predicted as a function of time for the duration of the next track segment. Because motion is known for a long time into the future, the path can be a long, smooth motion. One might even consider the predetermined path to be a "script" for the trolley-car's motions."

The above passage of Yerazunis makes no reference to a plurality of zones or zone boundaries. The above passage of Yerazunis also makes no reference to estimating movement of an avatar in relation to zone boundaries.

Claim 1 further requires that the terminal comprises (i) a client which provides a user interface to the virtual environment to allow user-control of an avatar, and (ii) apparatus for estimating the likelihood of said avatar, under the control of said user in the virtual environment, moving within a predetermined range of a boundary. Feature (ii) is not disclosed in Yerazunis.

Yerazunis describes a network 10 comprising a transmitting terminal 12 at which user inputs can be made, and a remote receiving terminal 14 at which the result of the user inputs can be viewed, such as movement of an avatar. Yerazunis goes on to describe a system by which the effect of errors in the channel between the two terminals can be overcome by applying, at the receiving terminal, a smoothing algorithm which is determined according to the number of future location points supplied to it by the transmitting terminal. If two or more future points are provided, indicating known motion from, say, a pre-recorded animation, a Catmull-Rom spline function is applied. For short-term motion where at most a single future point is known, linear interpolation is used. For real-time user defined motion, linear extrapolation is used. (See column 4, lines 35-62).

As discussed above, Yerazunis fails to disclose zones or zone boundaries. In Yerazunis, in no way does the user-controlled terminal 12 perform any kind of likelihood or probability estimation as is required by claim 1. User-controlled terminal 12 merely sends positional information over the network. All decision making is performed at the receiving terminal 12, and even then this simply involves noting how many future points are available and, therefore, deciding which smoothing algorithm to use.

As regards the apparatus for estimating the likelihood of the avatar moving within a predetermined range of the boundary, claim 1 further requires storing data as to the relative frequency of occurrence of different categories of avatar movement.

The term "relative frequency" has a well understood meaning in the art, namely the ratio of the number of observations in a category to the total number of observations. Hence, the table appearing on page 19 of the specification provides an example set of

data representing the relative frequency of occurrence of different run length categories.

The relative frequency for a run length of 2.0-3.0 is thus the number of occurrences (700)

divided by the total number of observations (1000) which is 0.7.

The Office Action alleges that col. 7, lines 44-58 of Yerazunis discloses this

feature. Applicant disagrees. This passage describes an array of data representing

position (XYZ), axis (X) and rotation (ABC) for a particular object at different times.

There is no teaching or suggestion of deriving relative frequency data or any apparent

reason why such relative frequency data would be derived.

Claim 1 further requires reading from the stored data relative frequency data for

categories of movement such as would correspond to potential movement of the avatar

from its current position into a position within the predetermined range of the boundary.

No such feature is disclosed in Yerazunis. Col. 7, lines 21-28 of Yerazunis discloses:

> "The implementation of the object motion queue 86 is a simple linked list. A graphical object 90 contains a pointer 85 to the first element in the object motion queue. Each object motion queue block contains slots for TIME92, X94, Y96, Z98, A100, B102, C104, R106, and a pointer to the next object motion queue block 108. The final block in the object motion queue indicates it as last by having the value 0 as the pointer to next block 110."

The above passage relates to positional elements in a linked list. However, this

portion of Yerazunis fails to teach or suggest the above-noted claimed feature. If one

considers the Office Action's argument that Yerazunis discloses relative frequency data

in the form of a PAR data array, there would have to be some disclosure of a mechanism

arranged to read a particular subset of the PAR data for a particular category of

movement that would correspond to a avatar movement from its current position into a

position within range of a zone boundary.

No such disclosure is present. This is hardly surprising given that Yerazunis is

not concerned with identifying potential movement to a position within range of a zone

boundary.

Accordingly, Applicant respectfully submits that claims 1, 3-5, 7-14, 16-21, 23-29

and 33-34 are not "obvious" under 35 U.S.C. §103 over Yerazunis and Suzuki and

therefore respectfully requests that the rejection of these claims be withdrawn.

Claims 2, 6, 15, 22, 30 and 32 were rejected under 35 U.S.C. §103 as allegedly

being unpatentable over Yerazunis in view of Suzuki and further in view of Leahy et al

(U.S. '045, hereinafter "Leahy"). Claim 31 was rejected under 35 U.S.C. §103 as

allegedly being unpatentable over Yerazunis in view of Suzuki and further in view of

Cohen-Or (U.S. '567). Each of Leahy and Cohen-Or fails to remedy the above described

deficiencies of Yerazunis and Suzuki with respect to the claimed invention. Applicant

therefore respectfully requests that the above rejections under 35 U.S.C. §103 be

withdrawn.

Conclusion:

Applicant believes that this entire application is in condition for allowance and

respectfully requests a notice to this effect. If the Examiner has any questions or believes

that an interview would further prosecution of this application, the Examiner is invited to

telephone the undersigned.

Respectfully submitted,

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